Note.—*The minimum required for pass is 20 per cent. of the marks on each paper, and 40 per cent. of the marks in each group.*

Values.

4   1. Distinguish between *direct* and *indirect* demonstration. What propositions in Euclid, Book I., are proved by the latter method?

4   2. *(a)* If two triangles have the three sides of the one respectively equal to the three sides of the other, must the two triangles be equal in every respect?

(b) If the three angles of the one are respectively equal to the three angles of the other, must the triangles be equal in every respect?

(c) Can the angles of a triangle be changed without changing the length of the sides?

Give reasons in full.

6   3. In prop. ix., Book I., if the equilateral triangle be described on the same side of the joining line as the angle to be bisected, distinguish the cases that will arise, and show wherein the construction fails.

6   4. The greater side of every triangle is opposite to the greater angle.

8   5. Taking the ordinary construction of the preceding proposition, in which AC is the greater side and ABC the greater angle, show that the angle ABD is half the sum of the angles at the base BC, and that the angle CBD is half their difference.

10

6. If a straight line fall upon two parallel straight lines it makes the alternate angles equal to one another; and the exterior angle equal to the interior and opposite upon the same side; and likewise the two interior angles upon the same side together equal to two right angles.

8

7. In a right-angled triangle if one of the acute angles be double of the other, the hypothemese will be double the shorter side.

10

8. The complements of the parallelograms which are about the diameter of any parallelogram are equal to each other.

8

9. Let ABCD be a parallelogram and E a point in the diagonal DB. If through E a straight line, KEF, be drawn, parallel to AD, and meeting AB in K and DC in F; and also if MEN be drawn parallel to AB, and meeting AD in M and BC in N, show that the straight line which joins MF is parallel to the straight line which joins KN.

8

10. The straight lines which joins the middle points of the sides taken in order of any quadrilateral form a parallelogram.

10

11. If a straight line be divided into two equal parts and also into two unequal parts; the rectangle contained by the unequal parts together with the square on the line between the points of section, is equal to the square on half the line.

8

12 Show that the rectangle under the sum and difference of two lines is equal to the difference of their squares.

10

13. If a straight line be divided into any two parts, the squares on the whole line and on one of the parts are equal to twice the rectangle contained by the whole and that part, together with the square on the other part.